

# MATERIAL SAFETY DATA SHEET

**SRM Supplier:** National Institute of Standards and Technology  
Standard Reference Materials Program  
Bldg. 202 Rm. 211  
Gaithersburg, Maryland 20899

**SRM Number:** 3172a  
**MSDS Number:** 3172a  
**SRM Name:** Multielement Mix B-1  
**Date of Issue:** 09 August 2000

**MSDS Coordinator:** Joylene W.L. Thomas  
**Phone:** (301) 975-6776  
**ChemTrec:** 1-800-424-9300

**FAX:** (301) 926-4751  
**E-mail:** SRMMSDS@nist.gov

---

## SECTION I. MATERIAL IDENTIFICATION

---

**Material Name:** Multielement Mix B-1 Standard Solution

**Description:** SRM 3172a is a multielement solution consisting of arsenic, barium, calcium, cobalt, copper, lead, selenium, silver, strontium, thallium, and zinc at concentrations ranging from 10 µg/g to 510 µg/g, prepared gravimetrically with a nitric acid concentration volume fraction of 5 %.\*

**Other Designations:** **Multielements** (arsenic, barium, calcium, cobalt, copper, lead, selenium, silver, strontium, thallium, and zinc) in **Nitric Acid** (aqua fortis; hydrogen nitrate; azotic acid; engravers acid) **Solution**.

Name	Chemical Formula	CAS Registration Number
Nitric Acid	HNO <sub>3</sub>	7697-37-2

**DOT Classification:** Nitric Acid Solution, UN2031

**Manufacturer/Supplier:** Available from a number of suppliers

\*The elements in this solution have concentrations of less than 1.0 % and do not require individual CAS Numbers or MSDS information under current OSHA regulations.

---

## SECTION II. HAZARDOUS INGREDIENTS

---

Hazardous Component	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Nitric Acid	5	ACGIH TLV-TWA: 2 mg/kg or 5 mg/m <sup>3</sup>
		OSHA TLV-TWA: 2 mg/kg or 5 mg/m <sup>3</sup>
		Human, Oral: LD <sub>50</sub> : 430 mg/kg

### SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Nitric Acid
<b>Appearance and Odor:</b> A white to slightly yellow liquid that darkens to a brownish color upon aging and exposure to light; a strong, pungent odor
<b>Relative Molecular Mass:</b> 63.02
<b>Density:</b> 1.0257 (5 % nitric acid)
<b>Solubility in Water:</b> soluble
<b>Solvent Solubility:</b> decomposes in alcohol

## SECTION IV. FIRE AND EXPLOSION HAZARD DATA

**Flash Point:** Not applicable

**Method Used:** Not applicable

**Autoignition Temperature:** Not applicable

<b>Flammability Limits in Air (Volume %):</b>	<b>UPPER:</b>	Not applicable
	<b>LOWER:</b>	Not applicable

**Unusual Fire and Explosion Hazards:** Although nitric acid does not burn, it is a powerful oxidizing agent that can react with combustible materials to cause fires.

**Extinguishing Media:** Use extinguishing media that is appropriate to the surrounding fire. Use a water spray to dilute nitric acid and to absorb liberated oxides of nitrogen.

**Special Fire Procedures:** Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

## SECTION V. REACTIVITY DATA

**Stability:**          X   **Stable**               **Unstable**

**Conditions to Avoid:** Avoid contact with incompatible materials.

**Incompatibility (Materials to Avoid):** Keep nitric acid away from organic materials, plastics, rubber, and some forms of coatings. Nitric acid is incompatible with chlorine and metal ferrocyanide and ferrocyanide.

See Section IV: *Unusual Fire and Explosion Hazards*.

**Hazardous Decomposition or Byproducts:** Hazardous decomposition of nitric acid can produce various nitrogen oxides, including nitric oxide (NO), nitrogen dioxide (NO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), as well as nitric acid mist or vapor.

**Hazardous Polymerization:**                                 Will Occur                        X   Will Not Occur

---

**SECTION VI. HEALTH HAZARD DATA**

---

Route of Entry:      X      Inhalation                        X      Skin                        X      Ingestion

**Health Hazards (Acute and Chronic): Nitric Acid:** Nitric acid may be fatal if inhaled, swallowed, or absorbed through the skin. This material causes burns and is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

**Medical Conditions Generally Aggravated by Exposure:** Eye disorders, skin disorders, respiratory disorders, and allergies.

**Listed as a Carcinogen/Potential Carcinogen:**

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u>          </u>	<u>  X  </u>
In the International Agency for Research on Cancer (IARC) Monographs	<u>          </u>	<u>  X  </u>
By the Occupational Safety and Health Administration (OSHA)	<u>          </u>	<u>  X  </u>

**EMERGENCY AND FIRST AID PROCEDURES:**

**Skin Contact:** Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

**Eye Contact:** Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

**Inhalation:** If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

**Ingestion:** If ingestion occurs, wash out mouth with water. **DO NOT** induce vomiting. Obtain medical assistance immediately.

**Note (Nitric Acid):** Wash affected skin areas with 5 % solution of sodium bicarbonate (NaHCO<sub>3</sub>). If ingested, the risk versus the benefit of the passage of a naso-gastric tube is debatable. Activated charcoal is of no value. **DO NOT** give the exposed person bicarbonate to neutralize the material.

**TARGET ORGAN(S) OF ATTACK:**        **Nitric Acid:** Skin, teeth, eyes, and upper respiratory tract.

---

## SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

---

**Steps to be taken in Case Material is Released or Spilled:** Notify safety personnel of spills. Surfaces contaminated with spills should be covered with soda ash or sodium bicarbonate to neutralize the acid. Place the neutralized material into containers suitable for eventual disposal, reclamation, or destruction.

**Waste Disposal:** Follow all federal, state, and local laws governing disposal.

**Handling and Storage:** Provide general and local explosion proof ventilation systems to maintain airborne concentrations below the TLV. Provide approved respiratory apparatus for nonroutine or emergency use. Use an approved filter and vapor respirator when the vapor or mist concentrations are high. Wear gloves and chemical safety glasses where contact with the liquid or high vapor concentrations may occur.

An eye wash station and washing facilities should be readily available near handling and use areas. Wash exposed skin areas several times a day with soap and warm water.

**Note:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

---

## SECTION VIII. SOURCE DATA/OTHER COMMENTS

---

**Sources:** MDL Information Systems, Inc., MSDS *Nitric Acid*, March 12, 1998.  
The Merck Index, 11th Ed., 1989.  
The Sigma Aldrich Library of Chemical Safety Data, Ed. II, 1988.

**Disclaimer:** Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.